

of *Hayashida et al* and *Lampert et al*.

Presumably the Patent Examiner intended to reject all of the claims 6, 7, 9 to 20. In this Office Action the Patent Examiner has contended that the *Fabray et al* reference teaches a method of polishing and oxidizing a silicon wafer. Allegedly, the sole difference between the instant claims and the prior art is the specific compounds and the time of the process steps. However, the *Hayashida et al* reference teaches the claimed alkali compounds used on silicon substrates. The compounds can be organic and inorganic. The *Lampert et al* reference teaches that the steps of the process can be done as soon as possible. This rejection is respectfully traversed.

The present invention is directed to a process for treating a semiconductor wafer, comprising polishing the semiconductor wafer; immediately after polishing the semiconductor wafer removing the semiconductor wafer from the polishing plate; immediately after removing the semiconductor wafer from the polishing plate, bringing the semiconductor wafer into contact with an aqueous treatment agent solution for oxidizing a polished surface of the semiconductor wafer by action of the aqueous treatment agent solution, the wafer being brought into contact with the aqueous treatment agent solution in a manner which is

selected from the group consisting of (a) spraying the semiconductor wafer with the aqueous treatment agent solution, (b) dipping the semiconductor wafer into the aqueous treatment agent solution and (c) applying the aqueous treatment agent solution to the polished surface of the semiconductor wafer by means of a cloth which has been moistened with the aqueous treatment agent solution; and cleaning the semiconductor wafer.

The present invention also relates to the process step of storing the semiconductor wafer for at least 15 minutes in deionized water after contact with the aqueous treatment agent solution, before said cleaning of the semiconductor wafer.

Moreover, the present invention further relates to the method steps of flushing the treatment agent solution off the semiconductor wafer by using deionized water, after completing the oxidizing; and storing the semiconductor wafer for at least 15 minutes in deionized water after contact with the aqueous treatment agent solution, before said cleaning of the semiconductor wafer.

Enclosed herewith is a Declaration Under Rule 132 executed by one of the inventors, Mr. Heinrich Hennhöfer. In this Declaration, it is stated, as follows:

That the Patent Examiner has correctly stated in the Office Action dated April 19, 2002, that the timing of the process steps is one of the crucial points which delimits the present invention from the cited prior art.

That according to the present invention, it is crucial to bring a polished semiconductor wafer into contact with an oxidizing agent right after having removed the wafer from a polishing plate; and any procedure which differs from this sequence is going to have serious drawbacks.

That a diagram was prepared containing the Comparative Testing results.

That based on this diagram in the Rule 132 Declaration, *Lampert et al.* intended to form an oxide film on the wafers by adding an oxidizing agent to the wafers while the wafers were still lying on the polishing platen in order to stop the polishing process and to protect the wafer surface by the oxide film. However, this method is connected with the drawback that the forming oxide film will be partly destroyed by the mechanical action of the rotating polishing platen. Since there are locations which are not protected by an oxide film semiconductor material is removed by the action of the polishing agent which is

still present; this finally leads to defects which can afterwards be detected on the wafer surface as shown in the diagram in the Rule 132 Declaration.

Specifically, as shown for the prior art, the wafers are oxidized at the plate. The results are that the number of light point defects (LPD) per wafer ranges from about 200 to 1200. The average number of LPD per wafer averages between 400 to 600 LPD/wafer. This is in contrast to the results according to the present invention, wherein the number of LPD defects per wafer are probably less than 30 LPD/wafer. This very substantial improvement in wafer surface quality is a significantly new and unexpected result based upon the major reduction in LPD/wafer. These new and unexpected results are a strong indication of the nonobviousness of the claimed invention.

Moreover, if the oxidizing agent is supplied when the wafers are still lying on the polishing plate, the polishing of subsequent wafers is impaired unless the oxidizing agent is thoroughly removed from the polishing plate.

That the Patent Examiner has stated in the Office Action that *Lampert et al.* would teach that the steps were to be done as soon as possible. However, it is also disclosed that as soon as

possible has to be interpreted as meaning as soon as possible while the wafers are still lying on the polishing platen. *Lampert et al.* teaches adding an oxidizing agent, at the end of the polishing step, to the alkaline polishing agent flowing onto the workpiece surface (See column 1, lines 60-64). Also according to both examples given at the end of this reference, the wafers are still in the polishing machine when the oxidizing agent is added.

Therefore, as *Lampert et al.* do not disclose removing the wafer from the polishing plate before the oxidizing treatment, this document clearly leads away from the present invention.

Accordingly, even if the *Fabry et al.* reference is modified in accordance with the teaching of *Lampert et al.* one skilled in the art would not arrive at the presently claimed process.

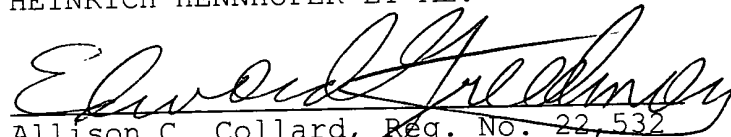
The prior art patents to *Fabry* and *Hayashida* were discussed in the Remarks portion of the Amendment previously mailed on November 6, 2001, but not received in the USPTO until January 17, 2002. All of these comments for distinguishing over these prior art references are herewith incorporated by reference.

In summary, the present invention, and all the claims are patentable under 35 U.S.C. 103 over all the prior art applied by the Patent Examiner. A prompt notification of allowability is

respectfully requested.

Respectfully submitted,
HEINRICH HENNHÖFER ET AL.

By:

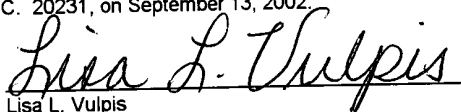


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Encl.: 1. Copy of Petition Two month Extension of Time
2. Hennhöfer Declaration Under Rule 132.

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to:
Assistant Commissioner of Patents, Washington, D.C. 20231, on September 13, 2002.



Lisa L. Vulpis